Meningitis, General (multiple etiologies)

Report all bacterial meningitis cases immediately

1) THE DISEASE AND ITS EPIDEMIOLOGY

A. Etiologic Agent

Meningitis may be caused by multiple organisms, including many types of bacteria, fungi, and viruses.

Note: This chapter is devoted to the bacterial and fungal types of meningitis that have not been allocated individual chapters. Depending on the type of meningitis, you may need to refer to one of the following chapters:

- For **meningococcal infections**, including meningitis (caused by the organism *Neisseria meningitidis*), refer to "Meningococcal Infection (Invasive)"
- For ***Haemophilus influenzae* infections**, including meningitis caused by *Haemophilus influenzae* group B (Hib), refer *to "Haemophilus influenzae* (Invasive)"
- **For viral (aseptic) meningitis**, refer to "Meningitis, Viral (Aseptic)"
- For **Group A streptococcal meningitis**, refer to "Group A Streptococcus (Invasive)"
- For ***Listeria monocytogenes* meningitis** refer to "Listeriosis"
- For ***Streptococcus pneumoniae* meningitis** in children under 5 years of age, contact the immunization epidemiologist on-call for case investigation and follow-up pending the development of a supplemental chapter to be added to this reference manual.

Streptococcus pneumoniae is one of the leading causes of bacterial meningitis in the United States. The other two leading causes, *N. meningitidis* and *H. influenzae*, are discussed in individual chapters. Meningitis caused by bacteria such as *Listeria monocytogenes*, group B streptococcus, group A streptococcus, *E. coli* K-1, *Klebsiella* species, *Enterobacter* species, or *Serratia* species are less common overall, but may be more prevalent in newborns, pregnant women, the elderly and immunocompromised persons. In an immunocompromised host, many other types of bacteria may cause meningitis as well. Numerous species of fungi may also cause meningitis, including *Cryptococcus neoformans* and *Coccidioides immitus*.

B. Clinical Description

Meningitis is an inflammation of the membranes of the brain and spinal cord. Symptoms vary, but often include a sudden onset of fever, stiff neck, headache, vomiting, lethargy and sometimes rash. Neonatal meningitis may accompanied by lethargy, seizures and apnea, as well as other symptoms. Pneumococcal meningitis has a high case-fatality rate (40–60%) even with treatment and is usually always fatal without treatment. The case-fatality rate for neonatal group B streptococcal meningitis is 25–50%. Untreated cryptococcal meningitis is often fatal.

C. Reservoirs

Humans are the reservoir for *Streptococcus pneumoniae*, *N. meningitidis*, *H. influenzae*, group A streptococcus and for group B streptococcus. The main reservoir for *Cryptococcus neoformans*, *Coccidioides immitus* and *Listeria monocytogenes* is the environment, especially soil.

D. Modes of Transmission

Modes of transmission vary depending on the organism. *S. pneumoniae* is transmitted from person-to-person primarily through respiratory secretions. Group B streptococcus may infect the fetus in utero or during delivery, or the infant through person-to-person contact. Cryptococcal and coccidioidal infections occur primarily through inhalation of airborne spores.

E. Incubation Period

The incubation period varies depending on the etiologic agent and in some cases is not well defined. It may be as short as 1–3 days for *S. pneumoniae*.

F. Period of Communicability or Infectious Period

The infectious period is unknown for both *S. pneumoniae* and group B streptococcus. Cryptococci and coccidioidal fungi are not transmitted from person-to-person.

G. Epidemiology

The epidemiology of bacterial meningitis has seen major shifts since Hib vaccine was introduced. Prior to Hib vaccine, Hib was one of the most common cause of bacterial meningitis in the United States, primarily affecting infants and young children. *S. pneumoniae* has become the leading cause of bacterial meningitis and the predominant cause in people over 30. Meningococcal meningitis is the second leading cause overall and as the predominant cause in those 2 to 30 years old. Group B streptococcal meningitis is the main cause of meningitis in the 1- to 23-month age group. Cryptococcal infection can be acquired worldwide and is reported to occur in 5% to 10% of adults with HIV infection. Coccidioidal infections are common only in arid and semiarid areas of the Western Hemisphere.

2) REPORTING CRITERIA AND LABORATORY TESTING SERVICES

A. What to Report to the Massachusetts Department of Public Health

- Report cases of healthcare provider-diagnosed bacterial or fungal meningitis accompanied by laboratory culture results indicating the presence of bacteria or fungi from cerebrospinal fluid (CSF).

Note: See Section 3) C below for information on how to report a case. For meningitis caused by viruses, *H. influenzae, N. meningitidis, L. monocytogenes,* and group A *streptococcus*, please refer to the reporting criteria of the chapter specific to those organisms.

B. Laboratory Testing Services Available

The Massachusetts State Laboratory Institute (SLI), Reference Laboratory has the ability to identify *S. pneumoniae*, *Listeria sp*., group B *streptococcus* and group A *streptococcus* in addition to many other pathogens. Occasionally, the Reference Laboratory forwards CSF samples for *Cryptococcus* or *Coccidioides* to the Centers for Disease Control and Prevention (CDC) in Atlanta for testing. For more information contact the Reference Laboratory at (617) 983-6607.

3) DISEASE REPORTING AND CASE INVESTIGATION

A. Purpose of Surveillance and Reporting

- To maintain a record of reported cases so increases in numbers can be more easily identified, thus facilitating appropriate control and prevention measures.

B. Laboratory and Healthcare Provider Reporting Requirements

Refer to the lists of reportable diseases (at the end of this manual's Introduction) for information.

Note: MDPH requests that cases of meningococcal meningitis (invasive infection) and *Haemophilus influenzae* meningitis (invasive infection) be **reported immediately** to the local board of health where diagnosed. If this is not possible, call the MDPH, Division of Epidemiology and Immunization at (617) 983-6800 or (888) 658-2850 (weekdays), or (617) 983-6200 (nights and weekends). See specific chapters on these infections for more information.

C. Local Board of Health Responsibilities

1. **Reporting Requirements**

Massachusetts Department of Public Health (MDPH) regulations (*105 CMR 300*) stipulate that each local board of health (LBOH) must report the occurrence of any case of bacterial or fungal meningitis, as defined by the reporting criteria in Section 2) A. Current requirements are that cases be reported to the MDPH Division of Epidemiology and Immunization, Surveillance Program using the appropriate MDPH case report form. Meningitis caused by viruses, *Neisseria meningitidis*, group A streptococcus, *Haemophilus influenzae* and *Listeria monocytogenes* is covered separately; refer to those chapters for reporting information. For fungal and all other bacterial meningitis, use the MDPH *Generic Disease Reporting Form* (in Appendix A). Refer to the *Local Board of Health Reporting Timeline* (at the end of this manual's introductory section) for information on prioritization and timeliness requirements of reporting and case investigation.

Note: For *Streptococcus pneumoniae* meningitis in children under 5 years of age, contact the immunization epidemiologist on-call at (617) 983-6800 or (888) 658-2850 for case investigation and follow-up pending the development of a supplemental chapter to be added to this reference manual.

2. **Case Investigation (for bacterial and fungal types of meningitis not covered in other chapters)**

   a. It is the LBOH responsibility to complete an MDPH *Generic Disease Reporting Form* (in Appendix A).

   b. Use the following guidelines in completing the form:
      1) Record meningitis as the type of illness being reported.
      2) Accurately record the demographic information.
      3) Accurately record date of symptom onset, symptoms, whether hospitalized, and other associated dates and events.
      4) Indicate the bacterial or fungal species identified and the type of specimen from which it was isolated. This information can be recorded in the "Comments" section at the bottom of the page.
      5) Record any other pertinent information in the "Comments" section at the bottom of the page.
      6) If you have made several attempts to obtain case information, but have been unsuccessful (*e.g.*, the case or healthcare provider does not return your calls or respond to a letter, or the case refuses to divulge information or is too ill to be interviewed), please fill out the form with as much information as you have gathered. Please note on the form the reason why it could not be filled out completely.

   c. After completing the form, attach lab report(s) and fax or mail (in an envelope marked "Confidential") to the MDPH Division of Epidemiology and Immunization, Surveillance Program. The confidential fax number is (617) 983-6813. Call the Surveillance Program at (617) 983-6801 to confirm receipt of your fax. The mailing address is:

      MDPH, Division of Epidemiology and Immunization
      Surveillance Program, Room 241
      305 South Street
      Jamaica Plain, MA 02130

d. Institution of disease control measures is an integral part of case investigation. It is the LBOH responsibility to understand, and, if necessary, institute the control guidelines listed below in Section 4), Controlling Further Spread.

4) CONTROLLING FURTHER SPREAD

A. Isolation and Quarantine Requirements (*105 CMR 300.200*)

None.

B. Protection of Contacts of a Case

There is no immunization or prophylaxis for contacts of cases *except* for meningitis caused by *H. influenzae* and *N. meningitidis* (refer to chapter specific to that organism).

C. Managing Special Situations

Reported Incidence Is Higher than Usual/Outbreak Suspected

If the number of reported cases in your city/town is higher than usual, or if you suspect an outbreak, investigate to determine source(s) of infection and mode(s) of transmission. Identification of common risk factors, such age, school, or workplace, may lead to the implementation of effective prevention and control measures. Consult with the epidemiologist on-call at the Division of Epidemiology and Immunization at (617) 983-6800 or (888) 658-2850. The Division can help determine a course of action to prevent further cases and can perform surveillance for cases that may cross several town lines and therefore be difficult to identify at a local level.

D. Preventive Measures

Personal Preventive Measures/Education

General measures to avoid many types of meningitis include frequent handwashing and avoiding sharing food, drinks, or eating utensils with other persons. Hib is now a vaccine-preventable disease. Occasionally, outbreaks of certain types of meningococcal meningitis may be controlled through vaccine use. Please refer to the "*Haemophilus influenzae*" and "Meningococcal Infection" chapters of this manual for more information on these vaccines.

Meningitis and *Meningococcal Disease Public Health Fact Sheets* can be obtained from the Division of Epidemiology and Immunization or through the MDPH website at <http://www.state.ma.us/dph/>. Click on the "Publications" link and scroll down to the Fact Sheets section.

ADDITIONAL INFORMATION

The following is the formal CDC case definition for "Bacterial Meningitis, Other." It is provided for your information only; it is not necessary to use this information for reporting or investigating a case. (CDC case definitions are used by the state health department and CDC to maintain uniform standards for national reporting.) For reporting to the MDPH, always use the criteria outlined in Section 2) A.

Clinical description

Bacterial meningitis manifests most commonly with fever, headache, and a stiff neck; the disease may progress rapidly to shock and death. However, other manifestations may be observed.

Laboratory criteria for diagnosis

- Isolation of a bacterial species from the cerebrospinal fluid.

Case classification
Confirmed: a clinically compatible case that is either laboratory confirmed or is accompanied by a positive blood culture.

REFERENCES

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